

What is claimed is:

- Sub 1. A drive wheel bearing assembly having a fixed type constant velocity universal joint, coupled to a wheel bearing, mounted to one end portion of an intermediate shaft, and a sliding type constant velocity universal joint, coupled to a differential, mounted to the other end portion of said intermediate shaft,
- wherein one end portion of a stub shaft is connected to an inner joint ring of said fixed type constant velocity universal joint via torque transmission portions;
- one end portion of said intermediate shaft is connected to the other end portion of the stub shaft via torque transmission portions;
- a threaded portion is formed on an outer diameter portion of either the intermediate shaft or the stub shaft;
- a nut member threadedly engages the threaded portion; and
- a keeper ring is fitted into annular grooves formed on the other outer diameter portion of said intermediate shaft or said stub shaft and an inner diameter portion of said nut member to allow said nut member not to move axially but to be rotatable.
- 25 2. A drive wheel bearing assembly according to claim

1, wherein the inner joint ring of said fixed type constant velocity universal joint is tightly fitted over the stub shaft, and said stub shaft is tightly fitted over the intermediate shaft.

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3. A drive wheel bearing assembly according to claim 1 or 2, wherein a maximum outer diameter of said fixed type constant velocity universal joint is smaller than an outer diameter of the wheel bearing.

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A 4. A drive wheel bearing assembly according to claims 1 ^{or 2} ~~to 3~~, wherein of said stub shaft and the intermediate shaft, at least the stub shaft is made hollow.

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5. A drive wheel bearing assembly having a fixed type constant velocity universal joint, coupled to a wheel bearing, mounted to one end portion of an intermediate shaft, and a sliding type constant velocity universal joint, coupled to a differential, mounted to the other end portion 20 of said intermediate shaft, said drive wheel bearing assembly comprising a stub shaft connected to an inner joint ring of the fixed type constant velocity universal joint by means of torque transmission portions and an engagement portion, formed on an outer diameter portion of 25 one end thereof, and connected detachably to the

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intermediate shaft by means of torque transmission portions and an engagement portion, formed on an inner diameter portion of the other end thereof,

wherein the torque transmission portions on the other
5 end portion of the stub shaft are made larger in diameter
than the torque transmission portions on the one end
portion.

6. A drive wheel bearing assembly having a fixed type
10 constant velocity universal joint, coupled to a wheel
bearing, mounted to one end portion of an intermediate
shaft, and a sliding type constant velocity universal joint,
coupled to a differential, mounted to the other end portion
of said intermediate shaft, said drive wheel bearing
15 assembly comprising a stub shaft connected to an inner
joint ring of the fixed type constant velocity universal
joint by means of torque transmission portions and an
engagement portion, formed on an outer diameter portion of
one end thereof, and connected detachably to the hollow
20 intermediate shaft by means of torque transmission
portions and an engagement portion, formed on an outer
diameter portion of the other end thereof,

wherein the torque transmission portions on the other
end portion of the stub shaft are made larger in diameter
25 than the torque transmission portions on the one end

portion.

7. A drive wheel bearing assembly according to any one of claims 1, 5, and 6, wherein said torque transmission portions are formed of serrations engaged with each other.

8. A drive wheel bearing assembly according to claim 5 or 6, wherein said engagement portion is adapted to have a protruding member arranged on an outer diameter portion 10 of the one end portion of the stub shaft and on an outer diameter portion or an inner diameter portion on the one end portion of the intermediate shaft to prevent axial movement thereof at an end portion of said torque transmission portions.

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- ~~Sub C~~ 9. A drive wheel bearing assembly having a fixed type constant velocity universal joint, coupled to a wheel bearing, mounted to one end portion of an intermediate shaft, and a sliding type constant velocity universal joint, 20 coupled to a differential, mounted to the other end portion of said intermediate shaft,

wherein an allowable plunging down to a bottom portion of an outer joint ring of said sliding type constant velocity universal joint is set to at least a 25 width of an inner joint ring of said fixed type constant

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velocity universal joint at a minimum operative angle of
the sliding type constant velocity universal joint.

Sub B2> 10. A drive wheel bearing assembly according to any
5 one of claims 5, 6, and 9, wherein a stem portion of the
outer joint ring of said fixed type constant velocity
universal joint is made hollow, and the hollow portion is
allowed to communicate with a mouse portion of the outer
joint ring.

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11. A drive wheel bearing assembly according to claim
10, wherein an end cap is mounted to the communicating
region between the hollow portion of said stem portion and
said mouse portion, and a communicating portion is formed
15 substantially at a center of the end cap.

A 12. A drive wheel bearing assembly according to any
one of claims 1 ^{5, 6, or 9} to 11, wherein said wheel bearing is
plastically connected to the outer joint ring of said fixed
20 type constant velocity universal joint.

A 13. A drive wheel bearing assembly according to any
one of claims 1 ^{5, 6, or 9} to 12, wherein a seal boot is mounted on
said stub shaft or on the outer diameter portion of the
25 other end portion of said intermediate shaft.

~~Sub C.~~ 14. A drive wheel bearing assembly according to claim 13, wherein said seal boot is formed of resin.

5 Sub B,~~3~~,^{5,6, or 9} 15. A drive wheel bearing assembly according to any one of claims 1~~to~~^{5,6, or 9} 14, wherein one of a plurality of rows of races in said wheel bearing is formed on an outer diameter portion of a hub ring constituting the wheel bearing, and another race is formed on an outer diameter 10 portion of a separate inner ring engaging the outer joint ring of said fixed type constant velocity universal joint.

~~Sub C.~~ 16. A drive wheel bearing assembly according to claim 15, wherein opposite edges of the hub ring and the separate 15 inner ring, having said another race formed on the outer diameter portion thereof and engaging the outer joint ring of the fixed type constant velocity universal joint, are brought into contact with each other, and a coupler collar is mounted to the abutting edge portions of said hub ring 20 and the inner ring.

~~Sub B.~~ 17. A drive wheel bearing assembly according to any one of claims 1~~to~~^{5,6, or 9} 14, wherein at least one of the plurality of rows of races of said wheel bearing is formed 25 integrally on the outer diameter portion of the outer joint

ring of said fixed type constant velocity universal joint.

A 18. A drive wheel bearing assembly according to any
one of claims 1^{six, or 9} to 14, wherein one of the plurality of rows
5 of races in said wheel bearing is formed on the outer
diameter portion of the hub ring constituting the wheel
bearing, and another race is formed on the outer diameter
portion of the separate inner ring engaging said hub ring.

10 Sub 1. > 19. A drive wheel bearing assembly according to claim
18, wherein projections and depressions are formed on one
of or both of engagement surfaces of said hub ring and said
inner ring; said engagement surfaces are expanded or
compressed radially to thereby connect plastically said hub
15 ring and said inner ring to each other; serrations formed
on said hub ring or said inner ring are allowed to transmit
torque; and a keeper ring detachably engages an annular
groove formed on said hub ring or said inner ring, allowing
said keeper ring to be axially engageable therewith.

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20. A drive wheel bearing assembly according to claim
19, wherein said keeper ring is made circular in cross
section and is acted upon by a specified axial force,
thereby allowing said keeper ring to contract radially by
25 itself to be withdrawn.

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21. A drive wheel bearing assembly according to claim
A 19 ~~or 20~~, wherein an outer diameter surface of said hub
ring and an inner diameter surface of said fixed type
constant velocity universal joint, extended from the
engagement surfaces between said hub ring and said inner
ring are connected engageably by serrations to each other.

22. A drive wheel bearing assembly according to claim
A 10 19 ~~or 20~~, wherein an outer diameter surface of said inner
ring and an inner diameter surface of said fixed type
constant velocity universal joint are connected engageably
by serrations to each other.

A 15 23. A drive wheel bearing assembly according to any
^{claim 19}
~~one of claims 19 to 22~~, wherein a serratⁿ engagement
region is formed on engagement surfaces except for the
plastically connected region between said hub ring and said
inner ring.

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A 24. The drive wheel bearing assembly according to
claim 19 ~~or 20~~, wherein an inner diameter surface of said
inner ring and an outer diameter surface of said fixed type
constant velocity universal joint are connected engageably
25 by serrations to each other.

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25. A drive wheel bearing assembly according to claim
18, wherein the inner diameter surface of said hub ring and
an outer diameter surface outboard of a torque transmission
5 coupling shaft are connected engageably by serrations to
each other; an outer diameter surface inboard of the torque
transmission coupling shaft and an inner diameter surface
of an edge portion outboard of said outer joint ring are
connected engageably by serrations to each other; a reduced
10 diameter edge portion inboard of said hub ring is
plastically deformed radially outwards by caulking to be
fixedly pressed against said inner ring in its outboard
direction; and an edge portion of the torque transmission
coupling shaft inserted from an outboard direction into the
15 inner diameter portion of said hub ring and the outer joint
ring are axially coupled to each other by detachable
coupling means.

26. A drive wheel bearing assembly according to claim
20 18, wherein the inner diameter surface of said hub ring and
the outer diameter surface outboard of the torque
transmission coupling shaft are connected engageably by
serrations to each other; the outer diameter surface
inboard of the torque transmission coupling shaft and the
25 inner diameter surface of an edge portion outboard of said

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outer joint ring are connected engageably by serrations to each other; the outer diameter of the torque transmission coupling shaft engaging the serrations of said outer joint ring is made larger at least than said inner ring; the edge 5 portion outboard of said torque transmission coupling shaft is plastically deformed radially outwards by caulking to be fixedly pressed against said inner ring in its outboard direction; and the edge portion of the torque transmission coupling shaft inserted from an outboard direction into the 10 inner diameter portion of said hub ring and the outer joint ring are axially coupled to each other by detachable coupling means.

27. A drive wheel bearing assembly according to claim 15 18, comprising a torque transmission coupling shaft for also serving as the inner ring allowed to engage said hub ring, wherein the inner diameter surface of said hub ring and the outer diameter surface outboard of the torque transmission coupling shaft are connected engageably by 20 serrations to each other; the outer diameter surface inboard of the torque transmission coupling shaft and the inner diameter surface of an edge portion outboard of said outer joint ring are connected engageably by serrations to each other; and the edge portion outboard of said torque 25 transmission coupling shaft is plastically deformed

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radially outwards by caulking to be fixedly pressed against said torque transmission coupling shaft in its outboard direction; and said torque transmission coupling shaft and the outer joint ring are thereby axially coupled to each other by detachable coupling means.

28. A drive wheel bearing assembly according to claim 18, wherein the inner diameter surface of said hub ring and the outer diameter surface outboard of the torque transmission coupling shaft, also serving as the inner ring, are connected engageably by serrations to each other; the inner diameter surface inboard of the torque transmission coupling shaft and the outer diameter surface of an edge portion outboard of the outer joint ring are connected engageably by serrations to each other; the edge portion outboard of said torque transmission coupling shaft is plastically deformed radially outwards by caulking to be fixedly pressed against said torque transmission coupling shaft in its outboard direction; and said torque transmission coupling shaft and the outer joint ring are axially coupled to each other by detachable coupling means.

29. A drive wheel bearing assembly according to claim 25, wherein a collar portion seated on a rim portion of a bore of the hub ring is provided on the edge portion

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outboard of said torque transmission coupling shaft, and pins or bolts are inserted radially detachably into the edge portion outboard of said outer joint ring so as to at least axially engage said torque transmission coupling
5 shaft.

30. A drive wheel bearing assembly according to claim
25, wherein the collar portion seated on the rim portion of
the bore of the hub ring is provided on the edge portion
10 outboard of said torque transmission coupling shaft;
annular grooves are formed on serrations between the edge
portion outboard of said outer joint ring and said torque
transmission coupling shaft; and a keeper ring is mounted
detachably into said annular grooves.

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31. A drive wheel bearing assembly according to claim
25, wherein annular grooves are formed on serrations
between said torque transmission coupling shaft, and said
hub ring and outer joint ring, and a keeper ring is mounted
20 detachably into said annular grooves.

A 32. A drive wheel bearing assembly according to claim
26 or 27, wherein annular grooves are formed on serrations
between said torque transmission coupling shaft and said
25 outer joint ring, and a keeper ring is mounted detachably

20 22 24 26 28 30 32 34 36 38 40

into said annular grooves.

33. A drive wheel bearing assembly according to claim 18, wherein the edge portion inboard of said hub ring is
5 extended to the inner diameter surface of the outer joint ring of said constant velocity universal joint; an outer diameter surface of the extended portion and the inner diameter surface of said outer joint ring are connected engageably by serrations to each other; and said hub ring
10 and said outer joint ring are fastened axially by bolts and nuts, providing a given maximum fastening force, thereby pressing the edge surface outboard of said outer joint ring against an edge surface of the inner ring at a given pressure.

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34. A drive wheel bearing assembly according to claim 33, wherein heat treatment is performed on a portion leading from seal engagement surfaces immediately near a race inboard of said hub ring to said serration-formed
20 region, and on a serration-formed region of said outer joint ring.

A 35. A drive wheel bearing assembly according to claim
33 or 34, wherein said fastening bolt is press fitted into
25 said outer joint ring.

36. A drive wheel bearing assembly according to claim
A 33 or 34, wherein said fastening bolt is fixedly clipped to
said outer joint ring.

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37. A drive wheel bearing assembly according to claim
A 33 or 34, wherein said fastening bolt is fixed to said
outer joint ring by press fitting a seal plate therein.

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